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SUBJECTIVE PSEUDOCYESIS IN NORMAL WOMEN WHO EXHIBIT ENHANCED IMAGININGS AND ELEVATED INDICATORS OF ELECTRICAL LABILITY WITHIN THE TEMPORAL LOBES: IMPLICATIONS FOR THE "MISSING EMBRYO SYNDROME"

M. A. PERSINGER

About one-fifth of 371 university women (mean age 26 years) reported that they had experienced symptoms of subjective pseudocyesis (false pregnancy). These women displayed markedly elevated indicators of complex partial seizure-like signs (particularly olfactory experiences, automatic behaviors and depersonalization), dissociative experiences, memory disruptions, hypomania, and right hemispheric arousal compared to women who did not report subjective pseudocyesis; for this phenomenon the ratio of women who were Roman Catholic vs Protestant was 8.2:1. This cluster of symptoms and experiences are very similar to those reported by women who believe their embryos have been removed after "impregnation" by non-human entities. Possible mechanisms are discussed.

Marked discrepancies often exist between the validity of patients' experiences and the patients' explanations for the cause of those experiences. Personal belief systems and contemporary sociological rationale can strongly affect the interpretation and the reality of relatively mundane neurocognitive processes. For example, during periods of significant emotional crisis, the content of dreams may be considered profound and their origin may be attributed to cosmic sources. Recently we have shown that the experience of the sense of a presence, which is usually described as an entity or "other", can be evoked by applying burst-firing patterns of electromagnetic fields along the temporoparietal lobes (Tiller & Persinger, 1994; Healey & Persinger, 1995). The attribution of the source, e.g., evoked by the experimental procedure or due to the visitation by an angel, of this relatively normal representation of the sense of self within the non-dominant hemisphere (Persinger, 1993; 1994; Jaynes, 1976) depends upon the context in which the experience occurs (Persinger & Makarec, 1992).

Please address correspondence and reprint requests to: Dr M. A. Persinger, Clinical Neuropsychology Laboratory, Laurentian University, Sudbury, Ontario, P3E 2C6; Tel. (705)-675-4826, Fax (705)-673-6532. E-mail: F1200002@nickel.laurentian.ca

An alleged "epidemic" of abduction experiences has been reported to have occurred within the last decade (Hopkins, Jacobs & Westrum, 1992; Strieber, 1987). These experiences, which are attributed to direct intervention by unspecified "alien intelligence" or presence, are remarkably similar to the historical reports of visitations by *incubi* and *succubi* and other apparitional phenomena (Evans, 1984). The experient is usually asleep in his or her bedroom and then suddenly awakens to experience the proximal presence of fetal-like entities. There are classical themes of dream sleep that include marked apprehension, vestibular sensations (floating), depersonalization (taken to another place), and either sexual examination or manipulation. The experiences are so vivid that they are considered real and "different from a normal dream".

One prevalent theme of this sexual emphasis for women has been the transient impregnation or implantation of an embryo within the uterus, an intermittent pregnancy, and then the "removal" of the embryo-fetus within about three months. If the exotic attribution to these experiences were removed, then the transient symptoms of pregnancy would be considered "pseudocyesis" or false pregnancy. Morning sickness, enlargement of breasts and disruption of menstrual cycles are the major components of both false pregnancy and these types of reports. Somata, defined as discolorations of the skin within areas that are congruent with the portion of the body schema represented within the experience, are also reported.

Traditionally, the term pseudocyesis has been reserved for those rare cases in which women display clinically verifiable (hormonal) signs of pregnancy. However there is now evidence that most pathognomonic anomalies are extreme manifestations of symptoms and signs that are present subclinically within the normal population. This study was designed to test the hypotheses that: 1) reports of psychological pseudocyesis may be more common than suspected, and 2) normal women who report episodes of these symptoms should also display an experiential profile that is similar to those reported by patients who exhibit partial complex (temporal) lobe epilepsy.

Young women who: 1) are more suggestible, 2) are more prone to dissociative states and 3) were exposed to cultural or religious traditions that emphasized acceptance of contradictions reported more frequent incidence of subjective pseudocyesis (Persinger, 1991). Normal women who exhibited these characteristics also reported experiences that have been inferred to reflect increased temporal lobe lability, particularly within the right hemisphere (Persinger & Makarec, 1987). Because: 1) the right hemisphere mediates vigilance and has minimal linguistic capacity (Budzynski, 1986) and 2) translation into linguistic (left hemispheric) images of right hemispheric processes is required for their "awareness", a relative enhancement of activity in this hemisphere should be associated with "missing time", or dissociation, and non-verbal or physiological (psychosomatic) expressions (Persinger, 1993). Electromagnetic stimulation of the right (but not

the left) temporoparietal region by low intensity (1 microTesla), burst-firing magnetic fields that promote opiate-like experiences has been shown to significantly increase suggestibility as defined by the Hypnosis Induction Profile (Healey & Persinger, 1995).

If the assumption that a continuum of temporal lobe lability within the human population is valid, then normal women should display less intense variants of the experiences and symptoms reported by women with verified complex partial epilepsy; these symptoms include: intermittent amenorrhea and the physiological correlates of hyperprolactinemia (Herzog, et al., 1982; 1986), transient episodes of disorientation and absences (Gattereau, Vezina, Rousseau & Bielmann, 1990), frank dissociation (Devinksy, Putnam, Grafman, Bromfield & Theodore, 1989), and hypomania (Taylor & Kreeger, 1987); Barczak, Edmunds & Betts, 1988). This paper reports evidence that supports these hypotheses.

METHOD

In the first part of this study, a total of 221 university women served as subjects; their mean age was 26 years (range 18-52; standard deviation = 9.2 years). They were enrolled in four different first year psychology courses; the data were collected over four successive years. Each subject was asked to complete Wilson and Barber's (1978) Inventory of Childhood Memories and Imaginings or ICMI (52 items) and the Personal Philosophy Inventory or PPI (Persinger and Makarec, 1987, 1993; Makarec and Persinger, 1990). Both inventories require true/false responses. Whereas the Wilson-Barber ICMI was designed to infer suggestibility and the capacity to evoke vivid images, the PPI was designed to evaluate signs and symptoms that resemble episodes of limbic lability or temporal lobe epilepsy within the normal population. For comparisons, the Dissociative Experiences Scale (DES), developed by Bernstein and Putnam (1986) and a questionnaire for hemisphericity (Vingiano, 1989) were also administered.

The central focus of this study was question 45 of the ICMI: "I have at some time in my life thought I was pregnant and in addition to not menstruating, developed other signs of pregnancy (e.g., morning sickness, abdominal enlargement, breast changes, etc.), only to find out later that I was not pregnant"; a total of 46 (21%) of these women reported this experience. There was no statistically significant difference between the ages of those who reported [26.2 (9.2)] and those who did not report [25.3 (9.6)] this syndrome.

Correlation (Spearman rho) coefficients were calculated by SPSS software using a Vax 4000 computer between the answer to this item and: 1) each of the other 51 items of the ICMI and 2) each of the 140 items of the PPI. In order to minimize chance inclusion, only those coefficients whose probability due to chance was less than 1 in 1000 ($p < 0.001$) were accepted as statistically significant.

For the second part of the study, an equation was calculated from specific items (identified in the first part of the study) from the Personal Philosophy Inventories of an *additional* 150 university women who had been administered the MMPI (Minnesota Multiphasic Inventory) - 168 over a four year period (overlap with the first sample = 3 years). The mean age and standard deviation for this sample was comparable to that of the first. About half the numbers of the women in the second part of the study had been referred for counselling while the other half had participated in classroom psychometric testing. Pearson correlations were examined for the relationship between the equation for the experiences of subjective pseudocyesis and each of the 13 MMPI scales. In order to obtain a psychiatric profile of those women who were most likely to display subjective pseudocyesis, individuals whose scores were within the upper one-quarter of the population (n = 35) were compared with those who were within the lower quarter of the population (n = 33). All adjunct analyses, e.g., factor analysis, multiple regression, also employed SPSS software.

RESULTS

Women who reported pseudocyesis also endorsed these ICMI items: ICMI 20 "When I was a young child, I believed that my doll(s) or stuffed animal(s) were alive" (0.53); ICMI 25 "When I was a child or teenager, at times I was afraid my imagining would become so real to me that I would be unable to stop it" (0.44); ICMI 28 "I have had an orgasm (or orgasms) just by imagining only (0.38); ICMI 44 "I have at times thought something happened to me, developed physical symptoms but later found out that what I thought happened never actually occurred (0.35). Signficantly (chi-square likelihood ratio = 22.20 $p < .001$) more women who were Roman Catholic (32%) reported pseudocyesis compared to those who were Protestant (5%); the phi coefficient was 0.31 and the odds ratio of Roman Catholic to Protestant reports (yes respondents RC/P divided by no respondents RC/P) of pseudocyesis was 8.2 to 1.

The means and standard deviations for the women who reported false pregnancy vs those who did not for the various clusters of items from the Personal Philosophy Inventory are presented in Table 1. The clusters included: control (for yes responding), admission (inverse of the Lie scale from the Minnesota Multiphasic Personality Inventory), complex partial seizure-like signs (CPES), interictal-like seizure signs, temporal lobe relevant indicators (religious and ESP experiences, etc.), right temporal lobe indicators, left temporal lobe indicators, exotic beliefs (e.g., reincarnation, visitation by aliens, etc.), and conservative or traditional religious beliefs; the specific items for each of these clusters as well as evidence of construct validity have been reported elsewhere (Persinger & Makarec, 1987; Makarec & Persinger, 1990; Persinger & Makarec, 1991; Persinger &

Richards, 1994). The scores for the Dissociative Experiences Scale (DES) and the Vingiano's Hemispheric Quotient are also given.

TABLE 1
MEANS AND STANDARD DEVIATIONS OF VARIOUS PSYCHOMETRIC MEASURES FOR WOMEN WHO DID NOT REPORT SUBJECTIVE PSEUDOCYESIS AND THOSE WHO REPORTED THIS PHENOMENON

Measure	No Pseudocyesis		Yes Pseudocyesis	
	M	SD	M	SD
Control Responses	78%	11%	80%	11%
Admission	75%	18%	82%	14%
Memory blanks	32%	25%	49%	24%*
Partial Seizure-Like	27%	16%	41%	19%*
Interictal-like	35%	13%	43%	11%*
Temporal Relevant	39%	12%	42%	7%
Left Hemisphere	30%	20%	28%	17%
Right Hemisphere	38%	15%	52%	15%*
Religious Beliefs	45%	27%	45%	25%
Exotic Beliefs	42%	20%	47%	18%
Vingiano's HQ	0.53	0.16	0.71	0.20*
Dissociative Exper.	13.6	8.2	20.4	9.5*

* $p < 0.001$

Women who reported subjective pseudocyesis reported significantly ($p < 0.001$; all dfs = 1,219) more frequent memory blanks [F = 15.84], signs and symptoms that suggest complex partial seizure-like activity [F = 25.21] and interictal-like [F = 17.66] experiences; these experiences were more typical of right [F = 29.63] rather than of left [F = 0.25] hemispheric involvement. The latter was vertified by the significantly greater [F = 41.82] Vingiano hemispheric quotient (0 to 1; <0.4 left; >0.6 right) of the experients of false pregnancy compared to those who did not report pseudocyesis. Not surprisingly, women who reported the experiences of false pregnancy also display significantly more [F = 23.83] dissociation. However the two groups did not differ with respect to the scores for the scales for "yes" responding i.e., control cluster [F = 1.03], admission (or "truth") [F = 5.75], temporal lobe relevant experiences [F = 3.62], exotic beliefs [F = 2.31], or conservative religious beliefs [F = 0.01].

The following items from the PPI were endorsed significantly [$p < 0.001$] positively or negatively by women who reported pseudocyesis (Spearman rho in parentheses):

Q97: I sometimes feel a sensation or a bulge in my abdomen (0.50).

Q109: I have had experiences when I felt as if I were somewhere else (0.41).

Q88: I often feel if things are not real (0.40).

Q79: Lightning is one of my fears (0.39).

Q10: There is good evidence that life exists on other planets (0.39).

Q75: I have never had "memory blanks" where I could not recall previous events (-0.34).

Q27: About once a year I will awaken and not be able to move (0.33).

Q68: There is something wrong with my mind (0.33).

Q76: I have heard an inner voice call my name (0.30).

Q82: At least once a month, I experience intense smells that do not have an obvious source (0.29).

Q110: I have dreams of floating or flying through the air at least once a year (0.28).

Q42: Intense smells bother me more than most people (0.25).

Q63: Sometimes in the early morning hours between midnight and 4.00 a.m., my experiences are very meaningful (0.22).

Q51: There must be something more to life (0.21).

Q52: Most of the time, I am happy (-0.21).

Q91: When I walk upstairs, I sometimes note a strange smell from nowhere (0.20).

Factor analyses of these items revealed (after Varimax rotation) three major factors that corresponded with three subclusters of the Temporal Lobe Signs Scale (Persinger & Makarec, 1991): these factors were automatic behavior, depersonalization, and olfactory experiences. The women who reported false pregnancy displayed significantly higher scores on these three clusters [$F(1,219) = 34.57$, 24.78 and 31.03, respectively] than women who reported that they had never experienced pseudocyesis.

Discriminant analysis, involving all of the above items from the PPI, was employed to discern those women who had reported pseudocyesis from those who had not. Only five items: Q97, Q88, Q79, Q10 and Q63 were sufficient to accurately classify 88% of the total population. Stepwise multiple regression and analysis was completed for these five items in order to predict the non-occurrence or occurrence of false pregnancy. The equation (multiple $r = 0.75$; adjusted r-squared = 53%) was: [(0.34 x Q97) + (0.22 x Q88) + (0.25 x Q79) + (0.26 x Q10) + (0.16 x Q63) -0.22]. The values in parentheses refer to the partial regression coefficients; the standard errors of the estimates for each was between 0.058 and 0.065.

For the second part of the study the scores for this equation were calculated from the appropriate items for an additional 150 university women; these scores were then correlated with each of the 13 MMPI scales. The strongest and most statistically significant ($p < 0.001$) correlations (Pearson r values in parentheses) occurred between the values for the equation and the scales that infer frequency

(F) of endorsement (0.40) and Ma or hypomania (0.45). Weaker ($p < 0.05$) correlations occurred between the scores for the equation and inferences for defensiveness or K scale (-0.30), psychaesthenia (0.25) and eccentric (Sc) thinking (0.34). According to the results of partial correlation analyses the first-order coefficient between the equation and the Sc scores was 0.21 ($p = 0.02$) when the shared variance associated with Ma was removed before the analysis; the first order coefficient between the equation and Ma was 0.32 ($p = 0.002$) when the shared variance associated with Sc was first removed.

The women whose scores for the equations were within the upper one-quarter (highest symptoms of subjective pseudocyesis) of the population ($n = 35$) displayed significantly elevated [$F(1,66) = 18.88$, $p < .001$; eta = .47) hypomanic [T-score mean and SD = 68 (10)] scores compared to those who reported the lowest incidence of these experiences [T-score mean and SD = 56 (10)]. Differences between these two groups for the other scales were neither conspicuous nor statistically significant.

DISCUSSION

Taylor and Kreeger (1987) reported a verifiable case of recurrent pseudocyesis that was also associated with recurrent hypomania. Several other groups of researchers have noted the conspicuous concordance of hyperprolactinemia, amenorrhea, disorientation and other complex partial signs that have been displayed by women with verified epileptic foci in the temporal lobes (Gattereau, et al., 1990; Herzog, et al., 1986). Our results are commensurate with the concept of a continuum of temporal lobe electrical lability (Persinger & Makarec, 1987) that would allow normal women to display less intense variants of pseudocyesis.

As predicted by this hypothesis, the existence of a marked similarity in subjective symptomatology (olfactory sensations, depersonalization, immobilization, memory blanks, amenorrhea, enhanced awareness of abdominal sensations) between normal women who reported subjective pseudocyesis and women with verified electrical foci within the right mesiobasal temporal lobe (Remillard, et al., 1983) was suggested by the present study. That the enhanced activation of the amygdala, mediated through the amygdalofugal pathways and stria terminalis can affect hypothalamic releasing factors [that control the release of ACTH (Gallagher, 1987) and the pituitary gonadotrophic hormones] is well established (Aggleton & Miskin, 1986). The significant inputs from the orbital frontal cortex, the insular cortex (which may be the primary projection area for viscera, including representations of the uterus), and the anterior cingulate region (MacLean, 1990) into specific amygdaloid nuclei indicate that cognitive-affective processes and real or anticipated changes in personal-social bonding (MacLean, 1990) could influence the amygdala's modulation of hypothalamic

function. In this context Taylor and Kreeger's (1987) case, which was associated with recent disruptions in social bonding with an emotionally significant male, might be significant.

Some mammals are prone to pseudocyesis or pregnancy blocking, depending upon exposure to a familiar or a strange male; smell appears to be a primary variable (Wickler, 1972). Whether or not real or perceived changes in biological bonds (perhaps mediated even as a type of "sign stimulus") within family settings could trigger subjective pseudocyesis in women deserves investigation. Considering the putative role of "right hemispheric" factors, the woman might not be aware of these experiences; however, they would be expressed through neurophysiological responses that are coupled to the same regions of the temporal lobe that mediate the affective dimensions of discourse planning and cognition (Persinger & Makarec, 1991).

Subtle social patterns could increase the basal rate of brief after-discharges from the right amygdaloid complex (Persinger, 1993a,b); they would disrupt rather than attenuate normal gonadotrophic periodicity. The maintained elevation of estrogen and progesterone would initiate the symptoms of pregnancy that would persist. It would be driven by aberrant limbic activity, maintained by unresolved affective right hemispheric processes such as subtle changes in social reinforcement patterns or expectancies. At some critical ontogenetic time, without the usual chorionic factor from the embryo, the "pregnancy" would suddenly cease. Because normal women with elevated right hemispheric indicators also experience more ego-alien, intrusive experiences - especially the "sense of a presence" (Persinger, 1989) a significant portion of these women should attribute the "sudden pregnancies", or their termination, to extrapersonal sources that are commensurate with their beliefs (Persinger & Richards, 1991).

The belief that human beings are being visited by alien intelligence has been reinforced and fostered by both the written (e.g., Strieber) and electronic (film) media. The authors (primarily Hopkins, Jacobs & Westrum) of the Roper Report (1992) concluded, on the basis of the reported incidence of relatively mundane symptoms (which reflect enhanced normal activity within the human temporal lobes), that several millions of people had been visited while sleeping by alien or extracorporeal forces. Whereas these experiences may have been explained by angels or by paranormal events (Persinger, 1974) during the 1940s or 1950s, the attribution now achieves a more contemporary sociopsychological motif.

The results of this study also indicate that the symptoms of pseudocyesis and the belief that one is pregnant is a relatively common experience in populations of young women. Whereas the sudden cessation of these symptoms may have been associated with relief several decades ago, there is now a social motif that allows alternative explanations. From an operational perspective, the visitation by incubi, the theft of "infants or embryos by fairies" and the attribution of sud-

den unexplained pregnancies of putative virgins to visitations by spirits and gods are remarkably similar. Because enhanced display of complex partial epileptic-like signs is associated with greater infusion of unusual ideas with personal, emotional significance [which is commensurate with Bear's (1979) sensory-limbic hyperconnectionism], exotic ideas would be more easily embraced as explanations. Indeed, Skirda and Persinger (1993) found a moderate positive correlation between the numbers of complex partial epileptic-like signs and the intensity of exotic beliefs (e.g., aliens are responsible for UFOs; there are spiritual creatures that visit people) but not traditional religious ideas for young women but not for young men (ages 14 through 25 years). Construct validity of this association was strongly indicated by the additional observation that enhanced endorsement of exotic beliefs by young women was also moderately, positively correlated with the numbers of errors during a dichotic word listening task. The latter has been considered an index of electrical lability within the temporal lobes or within intracallosal connections (Roberts, Varney, Paulsen & Richardson, 1990).

Childhood reinforcement histories that enhance the effect of the nonverbal (right hemispheric) components of emotional stress are expected to increase the incidence of both psychosomatic transformations and subjective pseudocyesis. That the majority of women who reported pseudocyesis were practising Roman Catholics supports the hypothesis because of this tradition's extensive state-dependent behaviors (rituals) and the encouragement to accept logical incongruities (e.g., "men and women are equal but only men can be priests"). The probability of greater promiscuity (and hence apprehensions of pregnancy) among Roman Catholic women relative to Protestant women in this sample is small in light of the similarities of reported coital activity by a subsample from both of these populations.

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